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XXXVII. *A Letter from Mr. John Reinhold Forster, F. A. S. to the Hon. Daines Barrington, Vice - Pres. R. S. on the Management of Carp in Polish Prussia.*

Somerfet-house Stable-yard, May 29, 1771.

DEAR SIR,

Read June 13, 1771. **Y**OU was so kind as to judge favourably of the few hints I threw out in a conversation, about *the management of Carp* in Prussia and in the electorates of Brandenburg and Saxony, and desired me to collect my observations upon that subject, into a small memoire. Though I am very sensible, that there are many more capable of giving a satisfactory account of the management of carp; I will, however, to obey your friendly commands, communicate to you such observations as I can collect from my own experience; from the methods observed in Prussia, Brandenburg, and Saxony, where I had opportunities to enquire into the subject, during my stay in these countries; and lastly, from the instructions of an anonymous German patriot, in a book, intituled, *A System of all the Sciences relative to Occonomy and the Finances*. In case you find these obser-

observations deserving to be laid before the Royal Society, I shall think myself very much honoured by it.

I am, with the sincerest sentiments of gratitude and regard,

DEAR SIR,

Your much obliged humble servant,

John Reinhold Forster.

*Observations on the best way of managing Carp, from real experience, and the best methods now in use.*

IT would be needless to speak of the natural history of this well-flavoured fish, after the satisfactory account given of it in the *British Zoology* \*, by that most accurate zoologist Mr. Pennant. I will only observe this, that though the carp is now commonly found in ponds and rivers, and generally thought to be a fresh-water fish †, the ancient zoologists ranged

\* *British Zool.* Vol. III. p. 300, &c.

† I have great reason to think, that many other fish, which, it is commonly conceived, can only live in the sea, may also exist, at least for several years, and perhaps breed, in fresh water.

the same among the sea-fish: and I know instances of its being caught in the harbour of Dantzic, between that city and a little town called Hela; which

The smelt or sparring (*Salmo Eperlanus Linnæi*) never comes up our rivers, but for a short time; and then does not penetrate much further than where the water continues to be brackish.

I have, however, been informed by Sir Francis Barnard (the late Governor of New England) that in a large pool which he rented not far from Boston, and which had not the least communication with the sea, several of these fish, originally introduced from the salt water, had lived many years, and were, to all appearance, very healthy.

I have also the following well-attested fact with regard to the common grey mullet, which it is believed was never before taken in fresh water.

Mr. Kymer hath made, near Kidwelly in Carmarthenshire, a communication between his collieries and an arm of the sea, by means of a canal.

Before this canal was completed, the salt water filled it at every tide, and several mullets were by this means introduced.

For these three or four years, the sea hath been entirely excluded; and the canal, from the constant influx of fresh water, hath ceased to be brackish for more than two years.

The mullets, however, continue to live in this canal; though Mr. Kymer informs me, they do not look in so good condition, as when fresh from the sea.

We are so much in the dark about the natural history of fish, particularly those of the salt water, that it is to be wished sea stews were made on some of our coasts, as I am told is very commonly practised in North America, and for a very trifling expence.

Nothing more is requisite, than either to find or dig a proper cavity, perhaps a yard below the low water mark, at spring tides, from which the sea should be excluded, except at a narrow entrance, where large stones should be piled from the beach to above the high water mark.

Through such an inlet, the stew would be every twelve hours, supplied with fresh salt water, at the same time that the fish would not be able to make their escape.

is situated at the extremity of a long, narrow, sandy promontory, projecting Eastwards into the sea, and forming the gulf before Dantzic, of about 30 English miles diameter. These carp were forced, as I suppose, by a storm, from the mouth of the Vistula, which here enters the Baltic, into the sea: and as the other two branches of the Vistula or Weixel disembogue into a large fresh water lake, called the Trish-Haff, which has a communication with the sea at Pillau; it is equally probable, that these fish came round from Pillau, to the harbour of Dantzic; especially as they are frequently found in the Trish-Haff.

The sale of carp makes a part of the revenue of the nobility and gentry in Prussia, Pomerania, Brandenburg, Saxony, Bohemia, Mecklenburgh, and Holstein; and the way of managing this useful fish is therefore reduced in these countries into a kind of system, built on a great number of experiments, made during several generations, in the families of gentlemen well skilled in every branch of husbandry.

The first thing which must be attended to, in case a gentleman chooses to have carp-ponds, is to select the ground where they are to be made:

By this very easily-contrived reservoir, sea-fish, when caught in too great numbers, might be kept for the supply of the table or market, when perhaps the weather will not permit them to be taken; and many ingenious experiments might be tried.

It is not impossible (for example) that the fish of the fresh water might be improved, by continuing in such a stew for a fortnight or three weeks, as horses are said to thrive by feeding on the salt marshes.

Daines Barrington.  
for

for upon the soil, water, and situation of a pond, the success in the management greatly depends. The best kind of ponds ought to be situated in a well-manured, fertile plain, surrounded by the finest pastures and corn fields of a rich black mould, having either mild or soft springs on the spot, or a rivulet that runs through the plain; the water ought to be mild and soft, by no means too cold, or impregnated with acid, calcareous, selenitic, or other mineral particles. The exposure must be sheltered against the cold blasting Easterly or Northern winds, by a ridge of hills, situated at some distance from the pond, enjoying fully the benign influence of the sun, far from any thick shady wood, that might intercept the beams of the sun, or where the leaves of trees might cause a putrefaction, or impregnate the water with astringent particles.

Such ponds as are surrounded by poor, cold, and stiff soils, are open to the East and North winds, have a wood on one or two sides, and hard or cold water, or such as issues from mines, moors, or mosses, are inferior in goodness.

Ponds in a poor, dry, or sandy soil, surrounded by pines or firs, with the just-mentioned inconveniences, are considered as the worst of all.

The ground towards the pond ought to have a gentle slope; for deep vallies are subject to great floods, and will then endanger the dikes in a wet rainy season; and often the expectations of many years are carried away.

The soil cannot be altered: it is therefore a chief qualification of a pond, to be contrived in a good soil.

The

The sun is a less material article ; provided therefore a pond can enjoy the morning and noon-tide sun, it matters not much if the wood be on one or two of its sides.

The water is a material point ; but in case the springs that supply the ponds are very cold and hard, it may be softened and tempered by exposing it to the sun and air in a large reservoir above the pond, or by leading it for a long way in an open exposure, before it enters the pond.

The quantity of water to supply the pond with, is another requisite ; too much water makes too great a canal necessary, for carrying its superfluity off ; and this is very expensive : too little water has another inconvenience, *viz.* that of keeping the water too long in the pond, and to cause a stagnation, without any sufficient fresh supplies ; and often, in a dry season, the scantiness of fresh water distresses the fish, and causes diseases and mortality among them.

The above remarks are general, and must be applied to all kinds of ponds ; but now I will enter into a more minute detail : it is found by experience most convenient, to have three kinds of ponds for carp. The first is called the spawning-pond ; the nursery is the second ; and the main-pond is the third and largest.

There are two methods for stocking the ponds with carp ; either to buy a few old fish, and to put them into a spawning-pond ; or to purchase a good quantity of one year's old fry, for the nursery. I will treat of both methods, and will add something about the management of carp in the main-pond.

A pond intended for spawning, must be well cleaned of all other kinds of fish, especially such as are of a rapacious nature, *viz.* pike, perch, eel, and trout; and also of all the newts or *larvæ* of lizards, and the *dytisci* or water-beetles, which frequently destroy quantities of the fry, to the great loss of the owner.

A rich soil, gentle sloping banks, mild springs, or a constant supply of good soft water, with a fine exposure in regard to sun and air, are the chief requisites for a good spawning-pond.

A pond of the size of about one acre, requires three or four male carp, and six or eight female ones; and thus further, in proportion to each acre, the same number of males and females.

The best carp for breeders are five, six, or seven years old, in good health, in full scale, without any blemish or wound (especially such as are caused by the *lernæa cyprini* Linn. a kind of cartilaginous worm) with fine full eyes and a long body. Such as are sickly, move not briskly, have spots as if they had the small-pox, have either lost their scales, or have them sticking but loosely to the body, whose eyes lie deep in their heads, are short, deep, and lean, will never produce good breed.

Being provided with a set of such carp as are here described, and sufficient to stock a pond with, it is best to put them, on a fine calm day, the latter end of March or in April, into the spawning-pond. Care must be taken, that the fish be not too much hurt by being transported in a hoghead, nor put into the pond on a stormy day; for they are easily thrown  
upon



upon the shallows on the sides, being weak and harrassed by being caught, removed, and not yet acquainted with the deep holes for their retreat, in the new habitation.

Carp spawn in May, June, or July, according as the warm season sets in earlier or later. The warm weather expands and swells gently the bodies of the fish; and their bellies being distended with roe and milt, they feel an itching about those turgid parts, and therefore swim to a shallow, warm, sheltered place, where the bottom of the pond is either somewhat sandy or gritty, where some grass and aquatic plants grow, or where some ozier branches and roots hang in the water; they gently rub their bodies against the ground, the grass, or ozers, and by this pressure, the spawn issues out; and as the milter, by a natural instinct, follows the spawner, and feels the same itching, the calls of nature are gratified in the same manner, and the soft roe or milt is spread over the spawn, and thus impregnated. Carp in this season are frequently seen swimming, as if it were in a circle, about the same spot, which is merely done with an intention of repeating the rubbing of their expanded bellies. The finest and calmest summer days are commonly those on which carp spawn; providence having thus made a provision for the greater security of the fry of so useful a fish; as otherwise, in a stormy day, the spawn would be washed towards the banks, where it would be eaten up by birds, or trampled upon by men and quadrupeds, or dried up by the heat of the sun, and a whole generation of carp entirely destroyed. In a pond of my uncle's, I frequently found the carp in a warm summer evening, round a  
large

large stone, rubbing their bellies against the hard sandy ground ; I often approached with as much silence as possible, put my hands and feet among the sporting carp, and had the satisfaction to see them pass and repass through my hands, without being in the least disturbed ; but at the least noise or quick motion occasioned by me, they moved away with surprizing velocity.

About the spawning season, great care must be taken, to keep out all aquatic fowl, wild and tame, from the ponds ; for geese and ducks not only swallow the spawn, but destroy still more of it, by searching the weeds and aquatic plants. It is therefore a general rule, to send twice a day, a man round the ponds, to scare all wild fowl, *viz.* swans, geese, ducks, cranes, and herons.

Sometimes crusians and carp, or tench and carp, being put together in a pond, and the males and females of each kind not being in a just proportion one to another, the different species mix their roe and milt, and thus produce mules or mongrel breeds.

The mules, between carp and crusians\*, seldom and slowly attain the size, which carp are capable of ;

\* The fish thus named is supposed to be the same with the rud or finscale (See Br. Zool. Vol. III. p 310.). It is not very common in England, and is generally esteemed to be much inferior to a carp in point of flavour, which I rather conceive to arise from its being placed in improper ponds, or eaten when it is not fully in season, as our countryman Mr. Henshaw gives the following account of the karouffe (*cyprinus carausius* of Linnæus). "The crawfish of that country (meaning Denmark) are at least twice as big as ours, and are excellent meat ; but the choicest pond fish they have, is called *karouffe*,

they

they are very deep, and shorter in proportion than carp, but of a very hardy nature.

The mules between carp and tench, partake of the nature of both fish, come to a good size; but some part of their body is covered with the small slimy scales of a tench, and some other part has the larger scales of carp; their flesh approaches nearer to that of a tench, and they are likewise of a less tender nature than the common carp: this latter kind of mule is called in Germany *spiegel-karpe*, i.e. the *mirror-carp*, the blotches with large scales among the smaller ones being considered as mirrors.

Whether these mules are capable of propagating their species, I cannot affirm; never having made any experiments on that subject; nor have I heard any thing said on that head with any degree of precision, or founded on experience. In some ponds in Lancashire, I was told, by a gentleman of great worth and honour, both these kinds of mules are now and then found.

I think it, however, not adviseable, to put carp and tench, or carp and crucians, in one pond, unless it be done for experiment's sake; in which latter case, a small pond, free from other fish, with one or two fish of each kind, will be sufficient to gratify curiosity, without debasing a generation of carp in a large pond.

“ somewhat resembling a roach, with his red fins; but it is  
“ near as big as the largest carp, and much better meat.”

Dr. Birch's Hist. R. S. Vol. III. p. 187.  
D. B.

The

The young fry being hatched from the spawn, by the benign influence of the sun, they are left the whole summer, and even the next winter, in the spawning-pond, in case the pond be so deep, that the suffocation of the young tender fry under the ice in a severe winter, is not to be apprehended, for it is by no means advantageous to take them out in the first months of their existence. However, if the shallowness of the pond, its cold situation and climate, make it necessary to secure the fry against the rigours of the ensuing winter, the water of the pond must be let off; the fry and old fish will gradually retire to the canal and ditches, which communicate with the hole in the middle of the pond, and a net, with small meshes, is then employed to catch both the fry and old ones. The old breeders are then separated from the fry, and both kinds put in separate ponds, that are warmer and more convenient for the wintering of these delicate fish. Care must be taken, to fix upon a calm, mild day, at the latter end of September, for the catching of the fry out of the spawning-pond.

The nurseries are the second kind of ponds intended for the bringing up the young fry. The best time to put them into the nursery is in March or April, on a fine and calm day. A thousand or twelve hundred of this fry may be allotted to each acre of a pond. The choice of the fry must be made according to the above enumerated characters of good and healthy fish, and must be carefully removed from one pond to another. It is likewise requisite to send people with long sticks, all the first day, round the pond, in order to drive the tender and weak fry from the sides into the pond, because they are bewildered

wildered in a strange place, and often become the prey of rapacious birds\*.

In case the pond be good, and not overstocked before, and the fry well-chosen and preserved, it is almost certain, they will grow within two summers so much as to weigh four, five, and sometimes six pounds, and to be fleshy and well-tasted. A great many Prussian gentlemen make a good profit, by selling their carp, after two years standing in the nursery, and export them even to Finland and Russia.

The main-ponds are the last kind. In these, carp are put, that measure a foot, head and tail inclusive. Every square of fifteen feet in the pond is sufficient for one carp, and will afford food and room for the fish to play in. The more room carp have, and consequently the more food the pond affords, the quicker will be the growth of the fish. The longer the pond has been already in use, the longer you intend to keep the carp in it, the more you desire to quicken the growth of them, the more you ought to lessen the number of fish destined for the pond. Spring and autumn are the best seasons for stocking your main-ponds. The growth of your fish will always be in proportion with the food they have: for carp are observed to grow a long time, and to come to a very considerable size, and a remarkable weight. I recollect to have seen carp above a yard long, and of 25 pounds weight; but I

\* I have reason to think that the common carrion crow should be added to the list of birds, which Mr. Forster hath before supposed destroy fish when in shallow waters, as I once saw this bird taken by a trap, which was baited with a fish for a heron.

D. B.  
had

had no opportunity to ascertain their real age. In the pond at Charlottenburg, a palace belonging to the king of Prussia, I saw more than two or three hundred carp between two and three feet long; and I was told by the keeper, they were between 50 and 60 years standing: they were tame, and came to the shore in order to be fed; they swallowed with ease a piece of white bread, of the size of half a half-penny roll.

During winter, ponds ought to have their full complement of water; for the deeper the water is, the warmer lies the fish. In case the pond be covered with ice, every day some holes must be opened, for the admission of fresh air into the pond, for want of which frequently carp perish.

In the summer, observe to clean the rails and wire-works, in the water-courses, of the weeds and grass, which frequently stop them up. Birds that feed on fish must be carefully kept out of the ponds. In a great drought, provision ought to be made, to keep the water at the same height as it commonly stands in the pond, *i. e.* between four and five feet. If the water stagnates and grows putrid, it must be let off, and a supply of fresh water be introduced from the reservoirs. If the weeds, especially reed and flags, and some of the aquatic grasses, over-run too much the pond, scithes fixed on poles of 16 or 20 feet, with a lead fastened to them to keep the scithes on the bottom of the pond, are thrown out, and then again drawn to the person that works with them, and the weeds will all be cut; after which operation, they must be drawn up by long harrows, and set in heaps on the shore for putrefaction, and in length of time,  
for

for manure. This cleaning of ponds, must never be done in a spawning-pond, where it would be the destruction of thousands of fish.

Autumn is the best season for catching such carp as are intended for the market. After the pond has been for five or six years in constant use, it is likewise time to let the water entirely off, and clear the pond of the mud, which often increases too much, and becomes a nuisance. When the pond is dry, it may be ploughed before the frost sets in, and next spring oats or barley should be sown in it, after a new ploughing; and it will repay the trouble to the owner with a rich and plentiful crop. When the loose superfluous mud is carried off out of the pond, care ought to be taken not to take the soil below the original level of the pond.

Some people sow a pond, which hath been laid dry for some months, with oats; and when they are growing, they fill the pond with water, and introduce carp for spawning, and think, by this contrivance, to procure food for the fish and something to rub their bellies against. But this practice seems to be more noxious than beneficial; for the growing oats will putrefy, and communicate putridity to the water, which can by no means be salutary to the fish.

The epicures sometimes feed carp, during the colder season, in a cellar. The following method is the best that can be observed for that purpose. A carp is laid on a great quantity of wet moss, spread on a piece of net, which then is gathered into a purse, and the moss so contrived, that the whole fish be entirely wrapt up in it: however, care must be taken to give the fish ease, and not to squeeze it, so that

it may have room to breathe in this confined attitude. The net with the fish and moss is then plunged into water and hung up to the cieling of the cellar. In the beginning, this operation must be very frequently repeated, at least every three or four hours; by length of time the fish will be more used to the new element, and will bear to be out of water for six or seven hours \*. Its food is bread soaked in milk, which, in the beginning, must be administered to the fish in small quantities; in a short time the fish will bear more and grow fatter. I saw the experiment tried in a nobleman's-house, in the principality of Anhalt-Deffau; and during a fortnight, I visited myself, every day, the fish, together with the young nobleman, my friend, whom I accompanied to his seat from the university, during the Christmas-vacation. After the fish had been kept in the above manner during a fortnight, it was dressed and served up at dinner, when every one present found it excellent in its flavour. At my late uncle's, I had an opportunity of repeating the experiment on a carp

\* It is known to every one that a carp will live a great while out of water; but perhaps it may not be so notorious, that the keeping him several hours in the common air, without any precautions, may be repeated from day to day, without any apparent inconvenience to the fish.

There is a fishmonger near Clare-market, who, in the winter, exposes for sale, a bushel at least of carp and tench, in the same dry vessel: but a small proportion of these can be sold in a day; and I have frequently been informed, that the fish continue in good health, notwithstanding their being thus exposed to the air six or seven hours for several successive days.

D. B.



that had been brought 20 miles wrapt up in wet mofs; but after the fish had been kept three days in wet mofs, during which it was fresh and healthy, it was employed to regale a friend, whose unexpected arrival accelerated its fate, before the experiment was finished.

John Reinhold Forster.